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For an explanation of the two-letter codes and the other abbreviations, reference is made to the explanations ("Guidance Notes on Codes and Abbreviations") at the beginning of each regular edition of the PCT Gazette.

As printed

(54) Title: COMPOSITE MATERIAL AND USE THEREOF FOR CONTROLLING THERMAL EFFECTS IN A PHYSICO-CHEMICAL PROCESS

(54) Titre : MATERIAU COMPOSITE, SON UTILISATION POUR LA GESTION DES EFFETS THERMIQUES DANS UN PROCESSUS PHYSICO-CHEMIQUE

(57) Abstract: The invention relates to a composite material, a method of controlling the thermal effects generated in a physico-chemical process using the aforementioned material and applications of said material and method. The inventive material comprises an active solid and a phase-change material. The phase-change material takes the form of micronodules having an average dimension of between 1 micrometer and 5 millimetres and said material is selected from materials with a liquid/solid phase change temperature of between -150 °C and 900 °C. The active solid is selected from solids that can be used in a method involving physicochemical processes which can be reversed exothermically in one direction and endothermically in the opposite direction.

(57) Abrégé : L'invention concerne un matériau composite, un procédé de gestion des effets thermiques générés dans un processus physico-chimique utilisant ledit matériau, ainsi que des applications du matériau et du procédé. Le matériau composite est constitué par un solide actif et par un matériau à changement de phase. Le matériau à changement de phase est sous forme de micronodules qui ont une dimension moyenne comprise entre 1 micromètre et 5 millimètres et il est choisi parmi les matériaux dont la température de changement de phase liquide/solide est entre 150°C et 900°C. Le solide actif est choisi parmi les solides utilisables dans un procédé mettant en jeu des processus physico-chimiques renversables exothermiques dans un sens et endothermiques dans le sens contraire.

WO 2004/050789 A1

INTERNATIONAL SEARCH REPORT

International Application No

PCT/FR 03/03463

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C09K5/06 B01D53/047 B01D53/26 C01B3/56 C01B13/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 971 605 A (TARMAN PAUL B) 20 November 1990 (1990-11-20) the whole document	1,2,4,5, 7-11,13, 20,21, 24-26
A	US 6 063 312 A (MANNHEIMER RICHARD J) 16 May 2000 (2000-05-16) claims	1,4,5,13
A	DE 199 54 769 A (REMMERS BAUCHEMIE GMBH) 17 May 2001 (2001-05-17) the whole document	1,4-6,13
A	US 5 861 050 A (PITTEL ALAN ET AL) 19 January 1999 (1999-01-19) claims 1,3,5	1,4,5,7, 8
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- * & * document member of the same patent family

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4971605	A	20-11-1990	DE 4022588 A1	28-03-1991
			DE 9018175 U1	14-05-1998
			JP 2008828 C	11-01-1996
			JP 3106437 A	07-05-1991
			JP 7047122 B	24-05-1995
US 6063312	A	16-05-2000	US 6284158 B1	04-09-2001
DE 19954769	A	17-05-2001	DE 19954769 A1	17-05-2001
US 5861050	A	19-01-1999	NONE	
DE 19630073	A	29-01-1998	DE 19630073 A1	29-01-1998
			AU 3941197 A	20-02-1998
			DE 59702643 D1	21-12-2000
			WO 9804644 A1	05-02-1998
			EP 0914399 A1	12-05-1999